

```

***** W S P R O *****
Federal Highway Administration - U. S. Geological Survey
Model for Water-Surface Profile Computations
Run Date & Time: 10/18/95  9:04 am  Version V092695
Input File:  ex82.wsp    Output File:  ex82.LST
*-----*

```

```

*F
***          Input Data In Free Format          ***

```

```

T1  SOME CREEK WATER SURFACE PROFILE
T2  (WSPRO USER'S MANUAL, J.O. SHEARMAN
T3  SUBCRITICAL FLOW
SI  1

```

Metric (SI) Units Used in WSPRO

Quantity -----	SI Units -----	Precision -----
Length	meters	0.001
Depth	meters	0.001
Elevation	meters	0.001
Widths	meters	0.001
Velocity	meters/second	0.001
Discharge	cubic meters/second	0.001
Slope	meter/meter	0.001
Angles -----	degrees -----	0.01 -----

```

Q   283.13   283.13   283.13

```

```

***   Processing Flow Data; Placing Information into Sequence 1   ***

```

```

WS  182.27   182.58   182.88

```

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

 * Starting To Process Header Record SEC-A *

XS SEC-A 30.48
 GR 32.6 , 189.82 40.2 , 186.25 51.8 , 183.42 57.9 , 181.04
 GR 75.6 , 179.98 82.6 , 179.98 89.3 , 179.85 94.5 , 179.98
 GR 96.9 , 180.77 103.0 , 181.62 106.7 , 183.02 112.2 , 184.03
 GR 115.8 , 184.40 121.9 , 184.46
 N .065 .027 .065
 SA 51.8 112.2

*** Completed Reading Data Associated With Header Record SEC-A ***
 *** Storing X-Section Data In Temporary File As Record Number 1***

*** Data Summary For Header Record SEC-A ***
 SRD Location: 30. Cross-Section Skew: .0 Error Code 0
 Valley Slope: .00000 Averaging Conveyance By Geometric Mean.
 Energy Loss Coefficients -> Expansion: .50 Contraction: .00

X,Y-coordinates (14 pairs)					
X	Y	X	Y	X	Y
32.600	189.820	40.200	186.250	51.800	183.420
57.900	181.040	75.600	179.980	82.600	179.980
89.300	179.850	94.500	179.980	96.900	180.770
103.000	181.620	106.700	183.020	112.200	184.030
115.800	184.400	121.900	184.460		

Minimum and Maximum X,Y-coordinates
 Minimum X-Station: 32.600 (associated Y-Elevation: 189.820)
 Maximum X-Station: 121.900 (associated Y-Elevation: 184.460)
 Minimum Y-Elevation: 179.850 (associated X-Station: 89.300)
 Maximum Y-Elevation: 189.820 (associated X-Station: 32.600)

Roughness Data (3 SubAreas)		
SubArea	Roughness Coefficient	Horizontal Breakpoint
1	.065	---
	---	51.800
2	.027	---
	---	112.200
3	.065	---

 * Finishing Processing Header Record SEC-A *

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

 * Starting To Process Header Record SEC-B *

XS SEC-B 64.0

GR	43.9 , 189.61	55.5 , 184.55	62.5 , 181.50	66.7 , 180.92
GR	67.7 , 180.95	83.8 , 179.79	90.5 , 179.76	96.3 , 179.82
GR	105.2 , 180.01	108.8 , 180.95	117.0 , 184.12	117.3 , 184.46
GR	121.9 , 184.58			
SA	55.5	117.0		

*** Completed Reading Data Associated With Header Record SEC-B ***
 *** Storing X-Section Data In Temporary File As Record Number 2***

*** Data Summary For Header Record SEC-B ***
 SRD Location: 64. Cross-Section Skew: .0 Error Code 0
 Valley Slope: .00000 Averaging Conveyance By Geometric Mean.
 Energy Loss Coefficients -> Expansion: .50 Contraction: .00

		X,Y-coordinates (13 pairs)			
X	Y	X	Y	X	Y
43.900	189.610	55.500	184.550	62.500	181.500
66.700	180.920	67.700	180.950	83.800	179.790
90.500	179.760	96.300	179.820	105.200	180.010
108.800	180.950	117.000	184.120	117.300	184.460
121.900	184.580				

Minimum and Maximum X,Y-coordinates
 Minimum X-Station: 43.900 (associated Y-Elevation: 189.610)
 Maximum X-Station: 121.900 (associated Y-Elevation: 184.580)
 Minimum Y-Elevation: 179.760 (associated X-Station: 90.500)
 Maximum Y-Elevation: 189.610 (associated X-Station: 43.900)

Roughness Data (3 SubAreas)		
SubArea	Roughness Coefficient	Horizontal Breakpoint
1	.065	---
		55.500
2	.027	---
		117.000
3	.065	---

 * Finishing Processing Header Record SEC-B *

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

 * Starting To Process Header Record SEC-C *

XS SEC-C 114.3

GR	60.0 , 188.78	68.3 , 185.43	75.3 , 181.65	83.5 , 180.28
GR	84.1 , 179.67	89.6 , 179.61	93.0 , 179.37	96.6 , 179.24
GR	99.7 , 179.37	107.6 , 179.73	108.2 , 180.68	114.0 , 181.71
GR	119.8 , 183.91	121.0 , 184.27	121.9 , 184.30	
SA	68.3	121.0		

*** Completed Reading Data Associated With Header Record SEC-C ***
 *** Storing X-Section Data In Temporary File As Record Number 3***

*** Data Summary For Header Record SEC-C ***
 SRD Location: 114. Cross-Section Skew: .0 Error Code 0
 Valley Slope: .00000 Averaging Conveyance By Geometric Mean.
 Energy Loss Coefficients -> Expansion: .50 Contraction: .00

X,Y-coordinates (15 pairs)					
X	Y	X	Y	X	Y
60.000	188.780	68.300	185.430	75.300	181.650
83.500	180.280	84.100	179.670	89.600	179.610
93.000	179.370	96.600	179.240	99.700	179.370
107.600	179.730	108.200	180.680	114.000	181.710
119.800	183.910	121.000	184.270	121.900	184.300

Minimum and Maximum X,Y-coordinates
 Minimum X-Station: 60.000 (associated Y-Elevation: 188.780)
 Maximum X-Station: 121.900 (associated Y-Elevation: 184.300)
 Minimum Y-Elevation: 179.240 (associated X-Station: 96.600)
 Maximum Y-Elevation: 188.780 (associated X-Station: 60.000)

Roughness Data (3 SubAreas)		
SubArea	Roughness Coefficient	Horizontal Breakpoint
1	.065	---
		68.300
2	.027	---
		121.000
3	.065	---

 * Finishing Processing Header Record SEC-C *

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

 * Starting To Process Header Record SEC-D *

XS SEC-D 152.4

GR	67.1 , 188.69	73.1 , 184.00	77.1 , 180.89	83.2 , 180.80
GR	84.1 , 180.07	89.9 , 180.01	95.1 , 180.01	96.0 , 179.52
GR	100.0 , 179.55	103.6 , 179.58	103.9 , 180.07	113.4 , 181.29
GR	118.6 , 183.91	121.9 , 184.00		
SA	73.1	118.6		

*** Completed Reading Data Associated With Header Record SEC-D ***
 *** Storing X-Section Data In Temporary File As Record Number 4***

*** Data Summary For Header Record SEC-D ***
 SRD Location: 152. Cross-Section Skew: .0 Error Code 0
 Valley Slope: .00000 Averaging Conveyance By Geometric Mean.
 Energy Loss Coefficients -> Expansion: .50 Contraction: .00

X,Y-coordinates (14 pairs)					
X	Y	X	Y	X	Y
67.100	188.690	73.100	184.000	77.100	180.890
83.200	180.800	84.100	180.070	89.900	180.010
95.100	180.010	96.000	179.520	100.000	179.550
103.600	179.580	103.900	180.070	113.400	181.290
118.600	183.910	121.900	184.000		

Minimum and Maximum X,Y-coordinates
 Minimum X-Station: 67.100 (associated Y-Elevation: 188.690)
 Maximum X-Station: 121.900 (associated Y-Elevation: 184.000)
 Minimum Y-Elevation: 179.520 (associated X-Station: 96.000)
 Maximum Y-Elevation: 188.690 (associated X-Station: 67.100)

Roughness Data (3 SubAreas)		
SubArea	Roughness Coefficient	Horizontal Breakpoint
1	.065	---
		73.100
2	.027	---
		118.600
3	.065	---

 * Finishing Processing Header Record SEC-D *

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

 * Starting To Process Header Record SEC-E *

XS SEC-E 195.1
 GR 62.2 , 188.66 73.1 , 180.77 78.6 , 180.80 84.1 , 180.52
 GR 89.3 , 180.46 94.8 , 180.46 100.3 , 180.37 105.8 , 180.74
 GR 111.2 , 180.68 117.0 , 183.18 121.9 , 183.48 122.2 , 185.31
 SA 73.1 111.2

*** Completed Reading Data Associated With Header Record SEC-E ***
 *** Storing X-Section Data In Temporary File As Record Number 5***

*** Data Summary For Header Record SEC-E ***
 SRD Location: 195. Cross-Section Skew: .0 Error Code 0
 Valley Slope: .00000 Averaging Conveyance By Geometric Mean.
 Energy Loss Coefficients -> Expansion: .50 Contraction: .00

X,Y-coordinates (12 pairs)					
X	Y	X	Y	X	Y
62.200	188.660	73.100	180.770	78.600	180.800
84.100	180.520	89.300	180.460	94.800	180.460
100.300	180.370	105.800	180.740	111.200	180.680
117.000	183.180	121.900	183.480	122.200	185.310

Minimum and Maximum X,Y-coordinates
 Minimum X-Station: 62.200 (associated Y-Elevation: 188.660)
 Maximum X-Station: 122.200 (associated Y-Elevation: 185.310)
 Minimum Y-Elevation: 180.370 (associated X-Station: 100.300)
 Maximum Y-Elevation: 188.660 (associated X-Station: 62.200)

Roughness Data (3 SubAreas)		
SubArea	Roughness Coefficient	Horizontal Breakpoint
1	.065	---
	---	73.100
2	.027	---
	---	111.200
3	.065	---

 * Finishing Processing Header Record SEC-E *

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

EX

=====

* Summary of Boundary Condition Information *

=====

#	Reach Discharge	Water Surface Elevation	Friction Slope	Flow Regime
---	-----	-----	-----	-----
1	283.12	182.279	*****	Sub-Critical
2	283.12	182.589	*****	Sub-Critical
3	283.12	182.889	*****	Sub-Critical
---	-----	-----	-----	-----

=====

* Beginning 3 Profile Calculation(s) *

=====

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

	WSEL EGEL CRWS	VHD HF HO	Q V FR #	AREA K SF	SRDL FLEN ALPHA	LEW REW ERR
Section: SEC-A	182.278	.518	283.124	88.821	*****	54.749
Header Type: XS	182.797	*****	3.187	4791.65	*****	104.723
SRD: 30.481	181.963	*****	.763	*****	1.000	*****

==135 CONVEYANCE RATIO OUTSIDE OF RECOMMENDED LIMITS.
 "SEC-B" KRATIO = 1.42

Section: SEC-B	182.554	.324	283.124	112.218	33.521	60.102
Header Type: XS	182.879	.082	2.522	6807.56	33.521	112.933
SRD: 64.003	181.799	.000	.553	.0025	1.000	.000
Section: SEC-C	182.603	.415	283.124	99.251	50.302	73.554
Header Type: XS	183.018	.093	2.852	6305.92	50.302	116.337
SRD: 114.305	181.855	.045	.598	.0019	1.000	.000
Section: SEC-D	182.652	.49	283.124	91.159	38.101	74.848
Header Type: XS	183.144	.086	3.105	5581.40	38.101	116.091
SRD: 152.407	182.094	.038	.667	.0023	1.000	.002
Section: SEC-E	182.729	.579	283.124	88.929	42.702	70.408
Header Type: XS	183.308	.119	3.183	5113.09	42.702	115.939
SRD: 195.109	182.357	.043	.770	.0028	1.120	.003

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

	WSEL EGEL CRWS	VHD HF HO	Q V FR #	AREA K SF	SRDL FLEN ALPHA	LEW REW ERR
	-----	-----	-----	-----	-----	-----
Section: SEC-A	182.588	.373	283.124	104.563	*****	53.954
Header Type: XS	182.962	*****	2.707	6149.63	*****	105.542
SRD: 30.481	181.963	*****	.607	*****	1.000	*****
Section: SEC-B	182.746	.272	283.124	122.420	33.521	59.662
Header Type: XS	183.018	.056	2.312	7772.47	33.521	113.428
SRD: 64.003	181.799	.000	.489	.0017	1.000	-.001
Section: SEC-C	182.776	.358	283.124	106.739	50.302	73.232
Header Type: XS	183.135	.073	2.652	7028.30	50.302	116.795
SRD: 114.305	181.855	.043	.541	.0015	1.000	.000
Section: SEC-D	182.812	.427	283.124	97.804	38.101	74.642
Header Type: XS	183.239	.069	2.894	6216.38	38.101	116.409
SRD: 152.407	182.094	.034	.604	.0018	1.000	.000
Section: SEC-E	182.868	.508	283.124	95.291	42.702	70.216
Header Type: XS	183.376	.096	2.970	5687.75	42.702	116.262
SRD: 195.109	182.357	.040	.701	.0023	1.129	-.001

***** W S P R O *****
 Federal Highway Administration - U. S. Geological Survey
 Model for Water-Surface Profile Computations
 Input Units: Metric / Output Units: Metric

SOME CREEK WATER SURFACE PROFILE
 (WSPRO USER'S MANUAL, J.O. SHEARMAN
 SUBCRITICAL FLOW

	WSEL EGEL CRWS	VHD HF HO	Q V FR #	AREA K SF	SRDL FLEN ALPHA	LEW REW ERR
Section: SEC-A	182.888	.282	283.124	120.274	*****	53.185
Header Type: XS	183.171	*****	2.353	7604.10	*****	106.335
SRD: 30.481	181.963	*****	.500	*****	1.000	*****
Section: SEC-B	182.987	.222	283.124	135.562	33.521	59.107
Header Type: XS	183.210	.038	2.088	9071.46	33.521	114.054
SRD: 64.003	181.799	.000	.425	.0012	1.000	.000
Section: SEC-C	183.004	.299	283.124	116.770	50.302	72.811
Header Type: XS	183.304	.055	2.424	8030.60	50.302	117.395
SRD: 114.305	181.855	.038	.478	.0011	1.000	.000
Section: SEC-D	183.028	.357	283.124	106.930	38.101	74.363
Header Type: XS	183.386	.053	2.647	7122.06	38.101	116.839
SRD: 152.407	182.094	.028	.533	.0014	1.000	.000
Section: SEC-E	183.067	.427	283.124	104.524	42.702	69.941
Header Type: XS	183.494	.073	2.708	6554.45	42.702	116.723
SRD: 195.109	182.357	.034	.618	.0017	1.141	-.001

ER

***** Normal end of WSPRO execution. *****
 ***** Elapsed Time: 0 Minutes 8 Seconds *****

WSPRO RESULTS

Figure 30-8D